

INTESTINAL HELMINTHS OF FIVE SPECIES OF SCINCID LIZARDS (SAURIA: SCINCIDAE) FROM WESTERN AUSTRALIA

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Summary

GOLDBERG, S. R. & BURSEY, C. R. (2000) Intestinal helminths of five species of scincid lizards (Sauria: Scincidae) from Western Australia. *Trans. R. Soc. Aust.* (2000), 124(2), 127-133, 30 November, 2000.

Intestines of five species of scincid lizards, *Ctenotus brooksi*, *C. pantherinus*, *Egernia depressa*, *E. inornata* and *E. striata* from Western Australia were examined for helminths. One species of Cestoda, *Oochoristica australiensis* and eight species of Nematoda, *Kreisiella chrysocampa*, *Masyachonia chabaudi*, *Parapharyngodon kartana*, *Pharyngodon kartana*, *P. tiliquae*, *Wanuristrongylus ctenoti*, *W. pupangawurpae* and *Abbreviata* sp. (larvae), were found. Fifteen new host records are reported.

KEY WORDS: Cestoda, Nematoda, scincid lizards, Australia.

Introduction

Scincidae is the dominant lizard family in Australia. It contains some 313 species (Cogger 2000) which constitute approximately 57% of all lizard species in Australia (Greer 1989). Helminth records exist for 49 species (Mawson 1972; Goldberg and Bursley 1995; Goldberg *et al.* 1999; Pichelin *et al.* 1999). The purpose of this paper is to report additional helminth records for *Ctenotus brooksi* (Loveridge, 1933), *C. pantherinus* (Peters, 1866), *Egernia inornata* Rosen, 1905, *E. striata* Sternfeld, 1919 and the first helminth records for *E. depressa* (Günther, 1875). Patterns of helminth infections in Australian skinks are examined and 19 new host records are added to the checklist of Pichelin *et al.* (1999).

Ctenotus brooksi inhabits sandy deserts of south-eastern Western Australia and adjacent desert areas of South Australia, the Northern Territory and parts of Queensland and New South Wales. *Ctenotus pantherinus* is widely distributed in south-western Western Australia, northern South Australia, the Northern Territory and western Queensland. *Egernia depressa* occurs in central-western coastal regions of Western Australia. *Egernia inornata* is widely distributed through the southern half of Western Australia from South Australia to western Queensland, in western New South Wales and north-western Victoria. *Egernia striata* is widely distributed through the interior of Western Australia to south-western Northern Territory and north-western South Australia (Cogger 2000).

Materials and Methods

Ninety three preserved lizards were borrowed from the herpetology collection of the Natural History Museum of Los Angeles County (LACM) and examined for intestinal helminths. These specimens had been collected between October 1966 and October 1968 for use in an ecological study (Pianka 1972) and were subsequently fixed in formalin and preserved in alcohol. Because the ecological study included stomach analysis, only small and large intestines remained with the carcasses. Stomachs had been deposited in the Western Australian Museum, Perth, Western Australia and carcasses in LACM. Numbers of individuals, mean snout-vent length (SVL), museum accession numbers and collection sites (longitudes, latitudes) for each species are given in the Appendix.

The small and large intestines, body cavity and liver of each lizard were examined for helminths using a dissecting microscope. Each helminth was placed on a glass slide in a drop of undiluted glycerol for study under a compound microscope. Nematodes were identified from these preparations; the cestode was stained with hematoxylin and mounted in balsam for identification.

Results

Gravid individuals of one species of Cestoda, *Oochoristica australiensis* Spasskii, 1951 and seven species of Nematoda, *Kreisiella chrysocampa* Jones, 1985, *Masyachonia chabaudi* Mawson, 1972, *Parapharyngodon kartana* (Johnston & Mawson, 1941), *Pharyngodon kartana* Johnston & Mawson, 1941, *P. tiliquae* Baylis, 1930, *Wanuristrongylus ctenoti* Jones, 1987, *W. pupangawurpae* Jones, 1987,

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were found. Cysts containing larvae of *Abbreviata* sp. were also found. Prevalence, mean intensity \pm SD, range, location of helminth infections by host species and 15 new host records are presented in Table 1. Because physalopterid nematodes normally inhabit the stomach (Anderson 1992), the values in Table 1 may under-report *Kreisiella chrysozampa*. Cysts containing larvae of *Abbreviata* occasionally

occur on stomach walls (Jones 1995) and may also be under-reported in Table 1.

Discussion

Infections of Australian scincid lizards by nematodes are summarized in Table 2. Infections by trematodes, cestodes and acanthocephalans are

TABLE 1. Prevalence (%), mean intensity ($\bar{x} \pm$ SD), range (r) and location for helminths from five species of Australian scincid lizards.

Host Helminth Location	<i>Ctenotus brooksi</i>		<i>Ctenotus pantherinus</i>		<i>Egeria depressa</i>		<i>Egeria inornata</i>		<i>Egeria striata</i>			
	%	$\bar{x} \pm$ SD	r	%	$\bar{x} \pm$ SD	r	%	$\bar{x} \pm$ SD	r	%	$\bar{x} \pm$ SD	r
Cestoda												
Anoplocephalidae												
<i>Oochristica australiensis</i>	-	-	-	-	*13	1.0	-	-	-	-	-	-
Small intestine												
Nematoda												
Physalopteridae												
<i>Abbreviata</i> sp. (larvae)	*4	1.0	-	*60	36 \pm 42.7	1-121	-	-	-	-	-	-
cysts in visceral peritoneum												
<i>Kreisiella chrysozampa</i>	16	1.3 \pm 0.5	1-2	*10	1.5 \pm 0.7	1-2	-	-	37	4.3 \pm 4.7	1-13	-
Small intestine, large intestine												
Cosmoceroidae												
<i>Maavachonia chabaudi</i>	*8	1.0	-	*15	1.7 \pm 1.2	1-3	-	-	*11	5.5 \pm 6.4	1-10	-
Small intestine, large intestine												
Pharyngodontidae												
<i>Parapharyngodon kartana</i>	-	-	-	*35	11.3 \pm 19.1	1-52	-	-	-	*14	2.3 \pm 2.3	1-5
Small intestine, large intestine												
<i>Pharyngodon kartana</i>	-	-	-	*15	7.7 \pm 10.7	1-20	-	-	-	-	-	-
Large intestine												
<i>Pharyngodon tiliquae</i>	-	-	-	-	-	-	*88	94.0 \pm 55.1	12-177	*42	41.1 \pm 23.7	12-76
Large intestine												*57
Amphibiophilidae												
<i>Wanaristronyxus ctenoti</i>	*4	4.0	-	20	1.8 \pm 1.0	1-3	-	-	-	*81	14.8 \pm 14.0	2-46
Large intestine												
<i>Wanaristronyxus papangawurpae</i>	-	-	-	-	-	-	-	-	16	5.3 \pm 6.7	1-13	-
Large intestine												

* New host record

listed in Pichelin *et al.* (1999). Additional records for scincid lizards are given in Goldberg & Bursley (1995) and Goldberg *et al.* (1999). Including the data from this paper, helminth records now exist for 50 species of Australian skinks: 16% (50/313) of the Australian scincid fauna. Mean number of helminth species per skink species was 2.8 ± 2.1 SD, range 1–12 helminth species. *Tiliqua scincoides* had the greatest helminth diversity (12 species). 18 different skink species are reported to harbour a single helminth species.

Of the Trematoda that infect Australian lizards, *Paradistomum crucifer* (Nicoll, 1914) has been reported from the scincids, *Hemiergis peronii*, *Lerista bougainvillii*, *Tiliqua scincoides* and *Trachydosaurus rugosus*, as well as a pygopodid, a gekkonid, and a varanid, *Mesocoelium microon* Nicoll 1914 from *Tiliqua scincoides*, *Microphallus* sp. from *Trachydosaurus rugosus*, an unidentified trematode from *Lerista bougainvillii*, and unidentified dicocelids from an agamid (Pichelin *et al.* 1999). *Mesocoelium microon* has also been reported from amphibians collected in Queensland (Nicoll 1914). Species of *Microphallus* are parasites of freshwater fishes, although experimental infections have been established in amphibians, reptiles and mammals (Yamaguti 1958).

Five species of Cestoda have been reported from Australian scincid lizards, namely, *Cylindrotaenia allisonae* (Schmidt 1980) from *Hemiergis peronii* and *Lerista bougainvillii*, *C. hickmani* (Jones 1985) from *Lampropholis delicata* (De Vis, 1888), *L. guichenoti* (Duméril and Bibron, 1839), *Nannoscincus maccoyi* (Lucas and Frost, 1894), *Saproscincus challengerii*, and *S. mustelinus* (O'Shaughnessy, 1874), *Ochhoristica australiensis* Spasskii, 1951 from *Trachydosaurus rugosus*, *O. trachysauri* (MacCallum, 1921) from *T. rugosus* and *O. vacuolata* Hickman, 1954 from *Egernia whittii* (Pichelin *et al.* 1999). M. Jones (1987) reported *Cylindrotaenia allisonae* to occur also in a gekkonid. MacCallum (1921) described *Taenia trachysauri* from specimens discovered in the intestine of a specimen of *Trachydosaurus rugosus* that had died in the New York Zoological Garden. Baer (1927) moved *T. trachysauri* to *Ochhoristica*. Johnston (1932) reported *O. trachysauri* in *T. rugosus*. Spasskii (1951) believed that substantial differences existed between the specimens described by MacCallum (1921) and Johnston (1932) and established *Ochhoristica australiensis* for Johnston's specimens. A major difference between *O. australiensis* and *O. trachysauri* is the arrangement of the testes; *O. australiensis* has one cluster, *O. trachysauri* has two. The specimen from *Egernia depressa* exhibited one cluster of testes. Unidentified species of *Ochhoristica* have been reported from

Hemiergis peronii and *Lerista bougainvillii* (Angel & Mawson 1968).

Cystacanths of Acanthocephala have been reported from Australian scincid lizards. *Sphaererechina rhynchus rotundocapitatus* Johnston and Deland, 1929 from *Eulamprus quoyii* (Duméril & Bibron, 1839), *Hemiergis decresiensis* (Cuvier, 1829) and *Lampropholis guichenoti*, collected in New South Wales, and unidentified cystacanths from *Hemiergis peronii* collected in South Australia (Pichelin *et al.* 1999).

The pentastome *Ruellielletta scincoides* Ali, Riley & Self 1984 was described from *Tiliqua scincoides* collected in South Australia (Ali *et al.* 1984) and has been reported from a gekkonid (Bursley & Goldberg 1999). Pentastomids were not listed in Pichelin *et al.* (1999).

Nematodes reported from Australian scincid lizards are listed in Table 2. Not included in Table 2 are reports of unidentified species of *Skrjabinelazia* from *Ctenotus schomburgkii* collected in South Australia (Goldberg & Bursley 1995), reports of *Parapharyngodon kartana* and *Skrjabinodon leristae* from a species of *Lerista* (= *Rhodona*) from South Australia (Mawson 1971) and reports of pharyngodonid or physalopterid larvae (Jones 1992, 1995; Goldberg *et al.* 1999; this paper). An unidentified species of *Skrjabinelazia* was also reported from a gekkonid lizard from South Australia (Angel & Mawson 1968; Mawson 1971). Males of this species of *Skrjabinelazia* have yet to be found; thus no species of *Skrjabinelazia* has been reported from Australian hosts.

Unidentified specimens of Pharyngodontidae were reported from *Cryptoblepharus plagiocephalus* by Jones (1995) which could belong to any one of the nine oxyurid species listed in Table 2. More difficult to assess are reports (Jones 1992, 1995; Goldberg *et al.* 1999) of encysted larvae identified as *Abbreviata* sp., *Physaloptera* sp. or physalopterid larvae. Seventeen species of *Abbreviata* and two species of *Skrjabinoptera* occur in Australian reptiles (Baker 1987); adults of species of *Physaloptera* are not known as parasites of Australian reptiles but seven species are known from Australian mammals, five from marsupials and two from native rodents (Norman & Beveridge 1999). Physalopterid larvae are widely distributed in Australia and have been reported from the scincid lizards, *Cryptoblepharus plagiocephalus*, *Ctenotus calurus*, *C. dixi*, *C. grandis*, *C. helena*, *C. pantherinus*, *C. quattuordecimlineatus*, *C. schomburgkii*, *Egernia inornata*, *E. striata*, *Eulamprus quoyii* and *Lerista muelleri* (Fischer, 1881) as well as from agamid, gekkonid and varanid lizards and several species of snakes (Jones 1995). Studies on diet have shown that varanid

lizards and the feral cat. *Felis catus* L., 1758, feed on skinks (Jones & Coman 1981; Shine 1986; James *et al.* 1992). Because these larvae are encysted and in relatively high prevalences, the skinks may serve as paratenic hosts.

Of the nematode species harboured by Australian scincid lizards (Table 2), *Hedruis longispicula*, *Johupearsonia egeriiae*, *Pharyngodon asterostoma*, *P. australis*, *P. lindleyi*, *P. tiliquae*, *Pneumonema tiliquae*, *Spinicauda australiensis*, *Thelamndros trichysauri* and *Veversia tuberculata* are known only from skinks; *Abbreviata antarctica* is known from scincids, agamids, varanids and snakes; *Kreisiella chrysocampa*, *K. tesucarii*, *Parapharyngodon fitzroyi* are known from scincids and agamids. *Maxvachonia brygooli* is known from scincids, agamids and a varanid; *M. chabaudi* is known from scincids, a gekkonid, a varanid and a snake; *Parapharyngodon kartana* occurs in scincids, agamids and gekkonids.

Pharyngodon kartana and *Wanuristrongylus papangawurpae* occur in scincids and gekkonids. *Physalopteroides filicauda* is known from scincids, agamids, gekkonids and varanids. *Pseudoricularia disparilis* occurs in scincids, amphibians and mammals. *Skrjabinoptera goldmani* is known from scincids, agamids, a gekkonid and varanids and *Wanuristrongylus ctenoti* is known from scincids, an agamid, a gekkonid and a varanid (Owen & Moorhouse 1980; Pichelin *et al.* 1999).

Helminthological studies on additional species are needed before the helminth diversity of Australian skinks is known.

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Appendix

Scincid lizards borrowed from Natural History Museum of Los Angeles County (LACM) with longitude and latitude of collection sites and helminths deposited in the U.S. National Parasite Collection (USNPC).

Ctenotus brooksi (N = 25, Mean SVL = 42 mm \pm 3 SD, range = 37-48 mm) collected 1967 Western Australia (WA), LACM (55525, 26° 32' S, 125° 58' E), (55520-55531, 55533-55534, 26° 06' S, 127° 44' E), (55539, 23° 49' S, 128° 51' E), (55558, 55560-55561, 55563-55564, 55566, 55570, 55573-55574, 55578, 55584, 28° 08' S, 123° 55' E), (55585, 28° 09' S, 123° 56' E); Northern Territory, LACM (55541, 23° 13' S, 129° 54' E) (55544, 55548, 55550-55551, 55553, 23° 13' S, 129° 54' E). USNPC 89250 *Abbreviata* sp. (3rd stage larva); USNPC 89247 *Kreisiella chrysocampa*; USNPC 89248 *Maxvachonia chabaudi*; USNPC 89249 *Wanaristrongylus etenoti*.
Ctenotus pantherinus (N = 20, Mean SVL = 42 mm \pm 3 SD, range = 37-48 mm) collected 1967, WA, LACM (55986-55988, 28° 27' S, 119° 05' E), (55991, 56000-56001, 56004, 28° 30' S, 125° 50' E), (56032, 56035, 28° 08' S, 123° 55' E), (56038, 56040-56043, 28° 28' S, 122° 50' E), (56046, 26° 14' S, 121° 13' E), (56053-56054, 56058-56059, 56061, 26° 17' S, 121° 00' E). USNPC 89256 *Abbreviata* sp. (3rd stage larva); USNPC 89251 *Kreisiella chrysocampa*;

USNPC 89252 *Maxvachonia chabaudi*; USNPC 89255 *Parapharyngodon kartana*; USNPC 89254 *Pharyngodon kartana*; USNPC 89255 *Wanaristrongylus etenoti*.
Egernia depressa (N = 8, Mean SVL = 91 mm \pm 7 SD, range 81-101 mm) collected 1968, WA, LACM (56403-56404, 28° 27' S, 119° 05' E), (56409-56413, 56418, 27° 05' S, 119° 37' E). USNPC 89257 *Oochoeristica australiensis*; USNPC 89258 *Pharyngodon tiliquae*.
Egernia inornata (N = 19, Mean SVL = 73 mm \pm 4 SD, range 66-80 mm) collected 1966-1968, WA, LACM (56434, 56436, 56438, 56440, 56442-56443, 28° 27' S, 119° 05' E), (56447, 56450-56452, 28° 08' S, 123° 55' E), (56455, 56463-56464, 56466, 56472, 56474, 56477-56479, 28° 30' S, 125° 50' E). USNPC 89259 *Kreisiella chrysocampa*; USNPC 89260 *Maxvachonia chabaudi*; USNPC 89261 *Pharyngodon tiliquae*; USNPC 89262 *Wanaristrongylus papangawutpae*.
Egernia striata (N = 21, Mean SVL = 95 mm \pm 8 SD, range 78-103 mm) collected 1967, WA, LACM (56513-56517, 56521-56525, 56530-56531, 56533, 56535-56537, 56539, 28° 28' S, 122° 50' E), (56541, 56545, 28° 28' S, 122° 51' E), (56546, 56548, 28° 28' S, 122° 50' E). USNPC 89263 *Parapharyngodon kartana*; USNPC 89264 *Pharyngodon tiliquae*; USNPC 89265 *Wanaristrongylus etenoti*.